

AUG 06 1979

ORNL/TM-7010

790718

#326

ORNL

INSTRUMENTATION

Radioisotope Distribution Program Progress Report for June 1979

E. Lamb

Access to the information in this report is limited to those indicated on the distribution list and to Department of Energy and Department of Energy Contractors

OAK RIDGE NATIONAL LABORATORY
OPERATED BY UNION CARBIDE CORPORATION - FOR THE DEPARTMENT OF ENERGY

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, contractors, subcontractors, or their employees, makes any warranty, express or implied, nor assumes any legal liability or responsibility for any third party's use or the results of such use of any information, apparatus, product or process disclosed in this report, nor represents that its use by such third party would not infringe privately owned rights.

Contract No. W-7405-Eng-26

OPERATIONS DIVISION

RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR JUNE 1979

E. Lamb 32

Work Sponsored by
DOE Office of Health and
Environmental Research

Date Published - August 1979

NOTICE This document contains information of a preliminary nature.
It is subject to revision or correction and therefore does not represent a
final report.

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37830
operated by
UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY



CONTENTS

| | <u>Page</u> |
|--|-------------|
| SUMMARY | 1 |
| RADIOISOTOPE PRODUCTION AND MATERIALS | 1 |
| Reactor Products Production | 1 |
| Iridium-192 Production | 1 |
| Cyclotron Service Irradiations | 1 |
| Cesium-137 Production | 1 |
| Strontium-90 Production | 2 |
| Short-Lived Fission Product Production | 3 |
| Krypton Enrichment Facility | 3 |
| Tritium Operations | 4 |
| Krypton-85 Operations | 4 |
| Packing and Shipping | 4 |
| Alpha Handling Facility | 4 |
| FPDL Operations | 5 |
| Miscellaneous | 5 |
| RADIOISOTOPE SALES | 5 |
| PUBLICATIONS | 6 |
| REPORTS | 6 |

RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR JUNE, 1979

E. Lamb

Summary

Information is reported on new production inventory status, operational problems, and radioisotope sales.

RADIOISOTOPE PRODUCTION AND MATERIALS

Reactor Products Production (*R. W. Schaich*)

| <u>Processed Units</u> | |
|------------------------|---------------------|
| <u>Radioisotope</u> | <u>Amount (mCi)</u> |
| Calcium-47 | 22 |

Iridium-192 Production (*R. W. Schaich*)

Twelve customer irradiation units and fifteen ORNL HFIR units (RB) containing 191,000 Ci of ^{192}Ir at HFIR discharge date were processed during the month of June, 1979. Seventeen shipments containing 99,600 Ci of ^{192}Ir were made during this period.

Cyclotron Service Irradiations (*M. R. Skidmore*)

During June, 1979, the ORNL 86-Inch Cyclotron operated 3:05 hours for ORNL and Oak Ridge DOE Programs for total charges of \$491.33. Non-ORNL irradiations were 107:15 hours for total charges of \$20,934.

A carbon-11 run for ORAU on June 5 was interrupted due to the rupture of the target capsule. On June 21 a pipefitter, stripping out unused pipe near the Kinney pumps, knocked a kerotest valve off the vacuum line to the cyclotron; and diffusion pump oil was swept back into the cyclotron vacuum tank. The rest of the month was spent in disassembling and degreasing the cyclotron.

Cesium-137 Production (*R. W. Schaich*)

Processing of a WESF container of $^{137}\text{CsCl}$ continued for the Terrestrial Radioisotope program. The $^{137}\text{CsCl}$ product inventory follows:

Product Inventory

(Decay calculated through August 31, 1978)

| <u>Inventory Material</u> | <u>Amount (Ci)</u> |
|--|--------------------|
| Cesium-137 Chloride Powder | 5,700 |
| Total Inventory Material | 5,700 |
| <u>Non-Inventory Material</u> | |
| Reject pellets and sources | 4,300 |
| Special form cans | 4,000 |
| Material returned or stored for customer | |
| J. L. Shepherd | 62,620 |
| New England Nuclear Corporation | 1,785 |
| Puerto Rico Sources | 7,700 |
| Lockheed | 19,100 |
| AECL powder | 6,800 |
| Radiation Resources | 12,500 |
| Gamma Industries | 8,200 |
| Minn. Mining & Mfg. Company | 10,000 |
| Total Non-Inventory Material | 137,005 |

Fabrication Summary

| | <u>June 1979</u> | | <u>CY 1979</u> | | <u>FY 1979</u> | |
|-------------------|------------------|-----------|----------------|-----------|----------------|-----------|
| | <u>No.</u> | <u>Ci</u> | <u>No.</u> | <u>Ci</u> | <u>No.</u> | <u>Ci</u> |
| Sources | | | | | | |
| Fabricated | 0 | 0 | 29 | 45,280 | 29 | 45,280 |
| Shipped | 0 | 0 | 29 | 45,280 | 45 | 60,540 |
| Special Form Cans | | | | | | |
| Fabricated | 0 | 0 | 0 | 0 | 0 | 0 |
| Shipped | 0 | 0 | 8 | 2,590 | 10 | 4,590 |

Strontium-90 Production (R. W. Schaich)The status of ^{90}Sr material is given in the table below.Product Inventory

(Decay calculated through August 31, 1978)

| <u>Inventory Material</u> | <u>Amount (Ci)</u> |
|--|--------------------|
| ^{90}Sr titanate powder ($\pm 5\%$) | 0 |
| Sources in fabrication | 0 |

Product Inventory (Contd)

| <u>Inventory Material</u> | <u>Amount (Ci)</u> |
|--|--------------------|
| Stock powder cans | 2,950 |
| Stock solution | 180 |
| Total Inventory Material | 3,130 |
| <u>Non-Inventory Material</u> | |
| ⁹⁰ Sr Fluoride | 60,000 |
| New England Nuclear Corporation | 175 |
| Calorimeter Standards | 4,700 |
| Weather Bureau Source | 11,100 |
| SNAP-7B | 152,500 |
| SNAP-7C | 24,000 |
| SNAP-7D | 139,500 |
| SNAP material purchase | 126,700 |
| Total Non-Inventory Material | 518,675 |
| TOTAL INVENTORY AND NON-INVENTORY MATERIAL | 521,805 |

Fabrication Summary

| | <u>June, 1979</u> | | <u>CY 1979</u> | | <u>FY 1979</u> | |
|-------------------|-------------------|-----------|----------------|-----------|----------------|-----------|
| | <u>No.</u> | <u>Ci</u> | <u>No.</u> | <u>Ci</u> | <u>No.</u> | <u>Ci</u> |
| Sources | | | | | | |
| Fabricated | 0 | 0 | 0 | 0 | 4 | 153,000 |
| Shipped | 0 | 0 | 0 | 0 | 4 | 153,000 |
| Special Form Cans | | | | | | |
| Fabricated | 0 | 0 | 0 | 0 | 0 | 0 |
| Shipped | 0 | 0 | 1 | 10 | 1 | 10 |

Short-Lived Fission Production (H. Bailey)

The modification of the Short-Lived Fission Product Facility proceeded on schedule. The maintenance phase of this operation will be completed July 15, 1979. Tentative startup date is August 1, 1979.

Krypton Enrichment Facility (J. R. DeVore)

The south bank of the ⁸⁵Kr Thermal Diffusion Columns continued operation while the north bank of three columns remains shut down as an energy conservation measure. Enriched (second cycle) feed was added to the operating columns and depleted tails were withdrawn. Two columns were pressurized slightly (14.9 psia and 16.4 psia).

The Enriched ^{85}Kr Storage System was purged and evacuated in preparation for the installation of an improved storage system.

Tritium Operations (*J. R. DeVore*)

Fourteen gas cylinders, two glass ampules, and twelve nonreturnable containers were loaded with 229,000 Ci of tritium for shipment to customers. A tritium monitor system has been installed to monitor the tritium working area. An additional unit will be installed in the cell ventilation duct to monitor discharges.

A safety analysis report for this facility has been delayed until the tritium contamination problem is resolved. A design for a uranium trap container for shipment of tritium has been initiated. The piping design for a new tritium handling system is scheduled to be completed in July, 1979.

Tritium exposure to operating personnel is being reviewed daily and new operating procedures have been placed in effect to reduce personnel exposure to tritium contamination. The contaminated floor tile has been removed and will be replaced with an urethane floor covering. Temporary room and cell ventilation air samplers have been installed to monitor tritium releases.

Krypton-85 Operations (*J. R. DeVore*)

Fourteen gas cylinders were loaded with 588 Ci of ^{85}Kr for shipment to customers.

Packing and Shipping (*R. D. Johnston*)

One hundred and eighty-six packages were processed and shipped during the reporting period. The total weight shipped was 109,000 pounds.

| <u>Radioactive Solid Shipments</u> | <u>Radioactive Gas Shipments</u> | <u>Radioactive Liquid Shipments</u> | <u>Empty Containers</u> | <u>Total</u> |
|--|--------------------------------------|---|-----------------------------|--------------|
| 61 | 43 | 55 | 27 | 186 |

Alpha Handling Facility (*R. D. Johnston*)

Five packages of alpha-emitting material were prepared for shipment. Shipments of 10 grams of ^{241}Am and 108 grams of ^{237}Np were made to customers during June.

FPDL Operations (*F. V. Williams*)

Maintenance completed the Cell 10W modifications. The right manipulator has been installed and cleanout of the cell has been started.

The ^{137}Cs pollucite preparation for the Terrestrial Applications program was continued. The required amount of $^{137}\text{CsCl}$ to complete the work has been converted to $^{137}\text{Cs}_2\text{CO}_3$, and some $^{137}\text{Cs}_2\text{CO}_3$ remains to be converted to the pollucite. Three pellets were pressed, but one pellet broke upon extraction from the die. The other two pellets were acceptable and have been stored.

Miscellaneous (*R. W. Schaich*)

The design for a new ^{133}Xe loadout system was completed and installation was 90% complete at the end of the month.

The fabrication of 23 new containers for use in the ^{85}Kr and tritium business is in progress. Delivery is now scheduled for August, 1979. The design of a ^{85}Kr purification system has been initiated.

A new tritium cylinder decontamination station was designed and fabrication initiated in the Plant and Equipment shops. Completion of this station is scheduled for September, 1979.

RADIOISOTOPE SALES

J. E. Ratledge

Shipments made during the month that may be of interest are listed below:

| <u>Customer</u> | <u>Isotope</u> | <u>Amount</u> |
|----------------------------------|----------------|---------------|
| <u>Large Quantities</u> | | |
| American Atomics Corporation | Tritium | 50,000 Ci |
| Brandhurst Company, Ltd. | Tritium | 60,000 Ci |
| University of California | Tritium | 3,086 Ci |
| E.I. duPont de Nemours Company | Tritium | 7,616 Ci |
| ICN Pharmaceuticals Inc. | Tritium | 1,000 Ci |
| Merz & Benteli | Tritium | 30,000 Ci |
| New England Nuclear | Tritium | 10,000 Ci |
| Radiochemical Centre Ltd. | Tritium | 10,000 Ci |
| Saunders Roe Development | Tritium | 60,000 Ci |
| Self Powered Lighting | Tritium | 27,000 Ci |
| United States Radium Corporation | Tritium | 10,000 Ci |
| Trio Tech International | Krypton-85 | 300 Ci |
| Minnesota Mining & Mfg. Company | Krypton-85 | 9,984 Ci |
| Gulf Nuclear Inc. | Cesium-137 | 98 Ci |

Withdrawn Items

| <u>Customer</u> | <u>Isotope</u> | <u>Amount</u> |
|---|----------------|---------------|
| Mallinckrodt Inc. | Selenium-75 | 2.5 Ci |
| ORNL Dept. of Quality Assurance and Inspection | Iodine-131 | 2 mCi |

Items Used in Cooperative Programs

| | | |
|------------------------|---------------|--------|
| University of Kentucky | Platinum-195m | 10 mCi |
|------------------------|---------------|--------|

The radioisotope sales and shipments for the first nine months of fiscal year 1978 and fiscal year 1979 are given in Table 1.

Table 1. Radioisotope Sales and Shipments

| <u>Item</u> | <u>10/1/77 thru 6/30/78</u> | <u>10/1/78 thru 6/30/79</u> |
|----------------------------------|---------------------------------|---------------------------------|
| Inventory Items | \$ 104,086 | \$ 213,286 |
| Tritium | 1,278,480 | 1,444,426 |
| Major Products | 425,877 | 238,463 |
| Iridium-192 | 742,253 | 1,067,265 |
| Radioisotope Services | 217,280 | 293,192 |
| Cyclotron Irradiations | 217,210 | 368,325 |
| Miscellaneous Processed Material | 161,006 | 10,258 |
| Packing and Shipping | 163,750 | 141,380 |
| Total | \$3,309,942 | \$3,776,595 |
| Number of Shipments | 1,965 | 1,671 |

PUBLICATIONS

REPORTS

E. Lamb, *Radioisotope Distribution Program Progress Report for May, 1979*, ORNL/TM-6975, Oak Ridge National Laboratory (in press).

INTERNAL DISTRIBUTION

- | | |
|--------------------------|--------------------------------------|
| 1. F. N. Case | 11. M. E. Ramsey |
| 2. W. R. Casto | 12. J. E. Ratledge |
| 3. J. A. Cox | 13. C. R. Richmond |
| 4. R. F. Hibbs | 14. R. W. Schaich |
| 5. F. F. Knapp | 15. M. R. Skidmore |
| 6. E. Lamb | 16. M. J. Skinner |
| 7. B. F. Maskewitz, RSIC | 17-18. Central Research Library |
| 8. H. H. Nichol | 19-20. Laboratory Records Department |
| 9. C. L. Ottinger | 21. Laboratory Records - RC |
| 10. H. Postma | 22. Document Reference Section |

EXTERNAL DISTRIBUTION

- 23. B. J. Dropesky, LASL, Los Alamos, New Mexico
- 24-25. J. H. Jarrett, PNL, Richland, Washington
- 26. J. N. Maddox, DOE-OHER, Washington, DC
- 27. H. A. O'Brien, LASL, Los Alamos, New Mexico
- 28. F. J. Skozen (Krizek), Argonne Cancer Research Hospital, Chicago, IL
- 29. L. G. Stang, Jr., BNL, New York
- 30. W. H. Weyzen, DOE-OHER, Washington, DC
- 31-32. R. W. Wood, DOE-OHER, Washington, DC
- 33. Donner Laboratory Library, Univ. of California, Berkeley, CA 94720
- 34. Assistant Manager for Energy Research and Development DOE-ORO
- 35-36. Technical Information Center